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TUINA COMBINED WITH ACUPUNCTURE FOR LUMBAR DISC HERNIATION: EFFECTIVENESS, SAFETY AND MECHANISMS. A SYNTHESIS OF META-ANALYTIC EVIDENCE

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Abstract

Background: Lumbar disc herniation (LDH) produces radicular leg pain and low back pain through nerve root compression and local inflammation. Non-steroidal anti-inflammatory drugs (NSAIDs) and surgery help many patients but carry well-known harms, which keeps non-drug options in demand. Tuina and acupuncture are two such options and are often given together in Chinese clinical practice. Objective: To weigh the evidence on the effectiveness, safety and biological rationale of Tuina combined with acupuncture for LDH. Methods: We combined pooled estimates from published systematic reviews and meta-analyses of randomized controlled trials (RCTs), supplemented by individual trials and mechanistic reviews. We did not run a new database search. Findings were organized around the seven outcome domains of the 2026 Core Outcome Set for traditional Chinese medicine (TCM) trials in LDH. Certainty of evidence was judged by the authors in the GRADE manner. Results: In a meta-analysis of 28 RCTs (2,746 patients), multi-modal TCM regimens that included Tuina and acupuncture, added to conservative conventional medicine, reduced Visual Analogue Scale (VAS) pain more than conventional medicine alone (MD = −1.61, 95% CI −2.44 to −0.79; 6 trials, 600 patients). Oswestry Disability Index (ODI) scores fell by 8.52 points (95% CI −11.71 to −5.34) and Japanese Orthopaedic Association (JOA) scores rose by 4.83 points (95% CI 3.49 to 6.17). Heterogeneity was severe (I^2 = 85% to 98%) and certainty was low for each of these outcomes. In a review of pain after LDH surgery, acupuncture alone had lower odds of adverse events than drug control (OR = 0.27, 95% CI 0.11 to 0.62), but the pooled multi-modal estimate against conventional care was imprecise (RR = 0.50, 95% CI 0.23 to 1.10). Conclusions: Tuina with

acupuncture is associated with less pain and disability and appears acceptably safe over the short term. The evidence is of low certainty, mostly unblinded and largely drawn from bundled TCM regimens rather than from the pairing itself. A proposed fit with the natural resorption of herniated discs is plausible but unproven.

Keywords

lumbar disc herniation; Tuina; acupuncture; meta-analysis; Visual Analogue Scale; Oswestry Disability Index; disc resorption; Inflammation Preservation Strategy; Core Outcome Set.

1. Introduction

Lumbar disc herniation (LDH) begins when the nucleus pulposus pushes through a torn annulus fibrosus and reaches the spinal canal or the intervertebral foramen. The damage that follows is both mechanical and chemical. Displaced tissue presses on the nerve root or cauda equina, and it also sets off a local inflammatory reaction, rich in cytokines and chemokines, that sensitizes the root. Imaging work has documented structural nerve abnormalities in affected patients (Wang et al., 2022). Patients present with low back pain, leg pain that follows the sciatic dermatome, sensory or motor loss and a shorter walking distance. Working-age adults are hit hardest, so the cost falls on productive years.

Conservative care is the usual first step, and clinical practice guidelines such as those of the Japanese Orthopaedic Association support it for patients without red-flag features (Haro et al., 2022). The drug arm relies on NSAIDs, oral steroids, muscle relaxants and epidural steroid injections (ESI). Long-term NSAID use can damage the gastric mucosa and the kidney and adds cardiovascular risk. Surgery answers a different problem and brings its own. Failed back surgery syndrome, epidural scarring and recurrent herniation are recognized sequels of discectomy (Zhao et al., 2022; Fang et al., 2025). Both routes explain why clinicians look for effective treatment that avoids drugs and incisions.

Tuina and acupuncture are the two most widely used TCM answers. Tuina is a manual therapy built on musculoskeletal biomechanics and meridian theory. Practitioners press, knead and roll soft tissue and apply spinal fine-tuning manoeuvres,

with the stated aims of relaxing paravertebral muscle spasm, unloading the facet joints, correcting pelvic tilt and restoring segmental motion. Acupuncture uses fine needles at defined points, most often BL23 (Shenshu), GV3 (Yaoyangguan) and Huatuo Jiaji (EX-B2) in LDH. It is thought to engage local axon reflexes, endogenous opioid release, descending pain inhibition and microcirculation around the compressed root. Manual therapy combined with exercise has also shown benefit for discogenic pain (Osama et al., 2025).

The difficulty is that trials rarely test Tuina plus acupuncture as a clean two-arm package. More often both are folded into broader TCM regimens that may add herbs, traction or exercise (Guan et al., 2025), and the pooled data inherit that mix. The aim of this paper is to say what those pooled data can and cannot support. We organize the evidence around the Core Outcome Set for TCM trials in LDH (COS-TCM-LDH; ChiCOS2023000027) published by Qin et al. (2026). That set came from a review of 413 randomized trials, 30 patient interviews, 73 clinician surveys and a two-round Delphi exercise with 24 experts. It names seven domains: lumbar dysfunction, pain, recurrence, straight leg raise (SLR) angle, adverse events, TCM syndrome pattern and sciatica frequency.

2. Methods

2.1. Design and sources

This is a structured synthesis of published meta-analytic evidence. We did not run a new database search or re-extract data from primary trials. Quantitative estimates were taken from existing reviews: Kim et al. (2023) for multi-modal TCM used with conservative conventional medicine (CCM; 28 RCTs, 2,746 patients), Zhang et al. (2022) for acupuncture in patients with pain after LDH surgery (10 RCTs, 838 patients) and Du et al. (2025) for exercise therapy (8 trials, 611 patients). Individual trials of manual therapy (Danazumi et al., 2023; Zhou et al., 2021) informed the safety section. Mechanistic claims rest on reviews of disc resorption and its immunology (Gong et al., 2025; Lai et al., 2025; Wan et al., 2022; Zheng et al., 2024). Readers should therefore treat our pooled figures as second-hand and consult the original reviews for study-level detail.

2.2. Outcome framework

Results were sorted into the Core Outcome Set domains. Lumbar dysfunction was represented by the ODI (0 to 100%) and the JOA score (0 to 29). Pain was represented by the VAS or numeric rating scale. The remaining domains were recurrence, SLR angle, adverse events, TCM syndrome pattern and sciatica frequency. Few of the source reviews reported the last four in pooled form, so our quantitative results cover mainly pain, function, response rate and safety.

2.3. Appraisal

Risk-of-bias judgements follow those reported in the source reviews, which used the Cochrane tool. We assigned the certainty ratings ourselves, applying GRADE criteria (study limitations, inconsistency, indirectness, imprecision, publication bias) to the information the reviews gave. These ratings are therefore our judgement and not a formal GRADE assessment of primary data.

3. Results

3.1. Pain

The largest dataset comes from Kim et al. (2023). In six trials with 600 patients, adding TCM to CCM cut post-treatment VAS scores by more than CCM alone (MD = −1.61, 95% CI −2.44 to −0.79, P = 0.0001). The size of the benefit depended on background treatment. Without ESI the difference was MD = −1.48 (95% CI −2.64 to −0.31, P = 0.01); with ESI it was MD = −1.91 (95% CI −2.13 to −1.70, I^2 = 0%). Where controls received no oral NSAIDs, TCM led to MD = −1.90 (95% CI −2.09 to −1.71, I^2 = 0%). Where controls did take NSAIDs, the gap shrank and was no longer significant (MD = −1.36, 95% CI −2.80 to 0.09, P = 0.07).

That last result is easy to over-read. It is compatible with TCM performing about as well as NSAIDs, which would be useful given their toxicity, but a non-significant difference with such a wide interval cannot establish equivalence. It is simply inconclusive.

Reviews of single modalities give a similar picture. Zhang et al. (2022) pooled 10 RCTs (838 patients) and reported an overall VAS difference of MD = −1.26 (95% CI −1.72 to −0.79). Their population differs from the rest of this paper, because it consisted

of patients with pain after LDH surgery, so the result supports acupuncture as an analgesic in that setting but says less about conservatively managed LDH. Within that body of work, acupuncture outperformed drug treatment by MD = −1.44 and active rehabilitation by a much smaller margin (MD = −0.19). Du et al. (2025) reviewed exercise therapy, including traditional Chinese exercises such as Baduanjin, Yijinjing and Tai Chi, and found MD = −0.98 (95% CI −1.19 to −0.77) against controls without exercise.

3.2. Function

Disability scores moved in the same direction. In Kim et al. (2023), multi-modal TCM lowered the ODI by 8.52 points relative to conservative care (95% CI −11.71 to −5.34, P < 0.00001; 4 trials, 382 patients). This exceeds the commonly cited minimal clinically important difference for lumbar spine disorders, so patients would be expected to notice it when lifting, walking, sitting or working.

The JOA score captures symptoms, clinical signs such as SLR, strength and sensation, and daily activities. Across four trials (413 patients) TCM gained 4.83 points over controls (95% CI 3.49 to 6.17, P < 0.00001). All subgroups favoured TCM: 2.78 points with ESI (95% CI 1.63 to 3.93), 5.55 without ESI (3.90 to 7.20), 4.74 with NSAIDs (3.70 to 5.79) and 4.94 without NSAIDs (0.61 to 9.27), although the final interval is very wide. Zhang et al. (2022) reported a comparable JOA advantage for acupuncture over drugs after LDH surgery (MD = 4.93, 95% CI 2.85 to 7.01). Du et al. (2025) reported that exercise therapy increased spinal range of motion by 11.40 degrees (95% CI 7.33 to 15.47).

3.3. Response and cure

Categorical outcomes agree with the continuous scales. Kim et al. (2023) found, across 26 trials, that multi-modal TCM beat standard Western conservative care on total effective rate. In the acupuncture review of postoperative LDH pain (Zhang et al., 2022), the odds of total effective relief were almost five times higher than with drugs (OR = 4.85, 95% CI 2.59 to 9.08, I^2 = 0%), and clinical cure was also more likely (OR = 2.24, 95% CI 1.58 to 3.19, I^2 = 0%; 592 patients). Cure was defined as no radicular pain, full lumbar motion, a negative SLR test (above 70 degrees) and a full return to work.

These definitions are set by individual trial teams, assessed without blinding and prone to generous grading. The absence of statistical heterogeneity shows that trials agree on direction, not that they measured the same thing. Table 1 gathers the main estimates.

Table 1. *Pooled effect estimates for the main outcome measures.*

Outcome	Comparison	Trials (n)	Effect size [95% CI]	I^2	P-value
VAS (multi-modal TCM)	TCM + CCM vs. CCM alone	6 (n=600)	MD = −1.61 [−2.44, −0.79]	98%	0.0001
VAS (acupuncture, postoperative LDH pain)	Acupuncture vs. drugs	7 (n=745)	MD = −1.44	84%	<0.00001
VAS (exercise therapy)	Exercise therapy vs. control	8 (n=611)	MD = −0.98 [−1.19, −0.77]	92%	<0.00001
ODI	TCM + CCM vs. CCM alone	4 (n=382)	MD = −8.52 [−11.71, −5.34]	96%	<0.00001
JOA	TCM + CCM vs. CCM alone	4 (n=413)	MD = 4.83 [3.49, 6.17]	85%	<0.00001
Total effective rate (postoperative LDH pain)	Acupuncture vs. drugs	6 (n=538)	OR = 4.85 [2.59, 9.08]	0%	<0.00001

4. Safety

Safety reporting is thinner than efficacy reporting. Seven trials with 685 patients in Kim et al. (2023) gave a pooled risk ratio for adverse events of 0.50 for multi-modal TCM against conventional medicine (95% CI 0.23 to 1.10, P = 0.09, I^2 = 46%). The interval spans no difference, so the overall comparison is inconclusive, even though event rates in drug-treated control groups were more than double those in TCM arms.

The comparison is sharper for acupuncture alone. In patients with pain after LDH surgery, Zhang et al. (2022) found 73% lower odds of adverse events with acupuncture than with oral analgesics and NSAIDs (OR = 0.27, 95% CI 0.11 to 0.62, P = 0.002, I^2 = 0%). Drug groups reported epigastric burning, nausea, dizziness and raised liver

enzymes. Acupuncture groups reported minor bruising, short-lived muscle soreness and occasional mild light-headedness. Both lists come from trials that usually collected adverse events passively, so under-reporting is likely.

In trials of manual therapy and exercise (Du et al., 2025; Zhou et al., 2021; Danazumi et al., 2023), no severe treatment-related event was recorded. Examples of what was absent include neurological deterioration, nerve root injury, worsening herniation and cauda equina syndrome. Screening probably deserves some of the credit. Patients with severe osteoporosis, progressive motor loss, vertebral infection, spinal tumour or spondylolisthesis above Meyerding grade II are normally excluded. Even so, trials of a few hundred patients cannot detect rare serious events, so the absence of reports is reassuring but not proof of safety. Table 2 summarizes the comparisons.

Table 2. *Adverse events in intervention and control groups.*

Intervention	**Control**	**Effect [95% CI]**	**P-value**	**Typical events**
Multi-modal TCM (Tuina + acupuncture)	Conventional care (CCM)	RR = 0.50 [0.23, 1.10]	0.09	Transient soreness, mild fatigue
Acupuncture alone (postoperative LDH pain)	Oral drugs	OR = 0.27 [0.11, 0.62]	0.002	Minor haematoma vs. GI irritation, nausea
Acupuncture	Rehabilitation training	OR = 0.36 [0.07, 1.98]	0.24	Local needle discomfort, no severe events
Manual therapy and exercise	Passive control or traction	No severe events reported	—	Temporary post-manipulation stiffness

5. Biological rationale

5.1. Tuina

Chronic root irritation leads to muscle guarding and, over time, atrophy of the deep paraspinal muscles, mainly multifidus and erector spinae. Ultrasound and EMG studies of standardized Tuina protocols, including spinal fine-tuning and strong-tendon (Gong)

techniques, report thicker multifidus during active extension. If correct, this means better muscle reserve and smoother lumbopelvic movement.

Rotational and axial manoeuvres are also thought to change pressure inside and around the disc. Releasing facet capsule adhesions, widening the foramen and correcting sacroiliac rotation (about 3 to 5 degrees) and pelvic tilt (2 to 3 degrees) should lower shear stress at the annular tear. Less venous congestion in the epidural plexus, less root oedema and freer dural sleeves would follow. Most links in this chain are inferred from small imaging and EMG studies, and few have been tested directly.

5.2. Acupuncture

Acupuncture is believed to act at several levels. Needling at dermatomal points matching the affected root activates Aβ and Aδ afferents. According to gate control theory, this input dampens nociceptive traffic from C fibres in the substantia gelatinosa of the dorsal horn. Locally, needle rotation deforms tissue and triggers purinergic signalling through adenosine A1 receptors. Calcitonin gene-related peptide (CGRP) and nitric oxide are released, and the resulting vasodilation raises blood flow and oxygen tension around an ischaemic root.

Centrally, needling engages the hypothalamic-pituitary-adrenal axis and the periaqueductal gray, increasing endogenous opioids (β-endorphin, enkephalins, dynorphins) and lowering plasma ACTH. Animal models show suppressed p38 MAPK and ERK signalling together with lower substance P, TNF-α, IL-1β and IL-6. These data are largely preclinical, and their transfer to human sciatica remains an assumption.

5.3. Disc resorption and the Inflammation Preservation Strategy

Herniated disc material often shrinks without surgery. It was recognized on CT as early as the 1980s (Guinto et al., 1984), and recent reviews put spontaneous resorption at 60% to 90% for extruded and sequestrated herniations (Gong et al., 2025; Lai et al., 2025; Wan et al., 2022; Zheng et al., 2024). The mechanism is paradoxical. The inflammation that produces pain also drives the clearance.

The nucleus pulposus is immune-privileged. When it breaches the annulus and meets the vascularized epidural space, the immune system treats it as foreign. Repair then proceeds in three overlapping stages. New vessels grow in under the influence of

VEGF, TNF-α and FGF-2. Macrophages infiltrate and change phenotype: early M1 cells release matrix metalloproteinases (MMP-3, MMP-7, MMP-9) that digest aggrecan and collagen, and CD206+ M2 cells later restore homeostasis. Apoptosis through the Fas/FasL pathway and autophagy involving Beclin-1 and LC3-II then clear cell debris.

This sequence poses an awkward question for drug treatment. Potent NSAIDs and high-dose epidural glucocorticoids suppress cyclooxygenase pathways and may blunt neovascularization and macrophage clearance, and some studies report lower resorption rates after early intensive anti-inflammatory therapy. Gong et al. (2025) therefore proposed an Inflammation Preservation Strategy (IPS), which restricts potent anti-inflammatory drugs during the early resorption window of roughly days 3 to 14 after injury.

Tuina and acupuncture fit this strategy on paper. They ease pain through mechanical and neurohumoral routes, namely gate control, β-endorphin release and root decompression, and not by suppressing macrophage infiltration or vessel growth. The argument is attractive, but it is inferential. Direct trial evidence linking either therapy to resorption volume remains limited, and the IPS itself has not been tested against standard drug care in a randomized comparison. Table 3 sets out the proposed interactions.

Table 3. *Proposed biomechanical, neurobiological and immunological interactions of Tuina and acupuncture.*

Domain	**Tuina**	**Acupuncture**	**Proposed combined effect**
Spinal biomechanics	Releases facet joints, corrects 3°–5° rotation and 2°–3° pelvic tilt, decompresses roots	Relieves reflex muscle guarding through motor point twitch response	Better alignment, larger foraminal space, more normal gait
Neurovascular perfusion	Reduces epidural venous engorgement, aids perineural lymphatic clearance	Adenosine A1 activation; CGRP- and NO-mediated arterial dilation	Less ischaemic hypoxia of the root, faster removal of metabolic waste

Domain	Tuina	Acupuncture	Proposed combined effect
Analgesic pathways	Lowers nociceptor firing by releasing paraspinal adhesions	Activates gate control; releases β-endorphin and dynorphins; suppresses substance P	Quick relief of sharp radicular pain, longer-term desensitization
Biological resorption (IPS)	Keeps vascular conduits and regional blood flow intact	Modulates the autophagy/apoptosis axis without inhibiting macrophage MMP expression	Natural regression (60%–90%) alongside pain relief

6. Certainty of the evidence

The first problem is blinding. Manipulation is tactile and needling produces deqi, so neither patient nor practitioner can be blinded in ordinary practice. Sham devices exist, including Streitberger non-penetrating needles and sham manual contact, but trials that compare TCM with surgery or drugs seldom use them. This matters most for patient-reported endpoints such as VAS, where expectation alone can shift scores by amounts comparable to the effects reported here. Objective outcomes partly offset the worry. Blinded MRI assessment of resorption, goniometric SLR angle and nerve conduction velocity are reported to improve along with symptoms, which hints at an effect beyond placebo. Far fewer trials report them than VAS, however, so they cannot yet carry the argument.

The second problem is heterogeneity, with I^2 above 75% for VAS, JOA and ODI. Four sources stand out. Technique varies between operators and schools in force, duration (10 to 60 minutes) and frequency. Acupoint choice varies, since BL23, GV3 and Jiaji recur but supplementary points follow individual pattern differentiation. Co-interventions such as traction, other physical modalities or herbal decoctions (for example Duhuojisheng Tang) were often allowed. Baseline chronicity ranged from a few days to more than 18 months. A pooled mean across protocols this varied describes an average that may match no real treatment.

Indirectness is a further problem. The acupuncture-specific figures come from patients with pain after LDH surgery, and the exercise figures from exercise alone, so neither matches the Tuina-plus-acupuncture question exactly. Considering these issues, we rated certainty as low for VAS, ODI, JOA, total effective rate and adverse events (Table 4). Consistent direction across trials softens the inconsistency downgrade only slightly, because publication bias would produce the same consistency and funnel-plot assessment is missing for most of these pools. Almost all trials were also conducted in China, which limits how far results can be generalized to other health systems.

Table 4. *Authors' certainty ratings for the main outcomes.*

Outcome	Risk of bias	Inconsistency	Indirectness	Imprecision	Certainty
Pain (VAS)	Serious (no blinding)	Serious (I^2 = 98%)	Not serious	Not serious (n>600)	LOW
Disability (ODI)	Serious (no blinding)	Serious (I^2 = 96%)	Not serious	Not serious (n>380)	LOW
Function (JOA)	Serious (unclear concealment)	Serious (I^2 = 85%)	Not serious	Not serious (n>400)	LOW
Safety (adverse events)	Serious (underreporting)	Not serious (I^2 = 46%)	Serious (postoperative population for acupuncture data)	Not serious (n=685)	LOW

7. Discussion

7.1. What the evidence supports

Pain relief of about 1.4 to 1.6 VAS points, an ODI gain above the usual threshold and a clearly lower rate of adverse events than with oral drugs together make a reasonable case for Tuina and acupuncture as a non-drug option. Several features also make the findings more believable than the usual TCM literature: effects were similar across subgroups, objective measures moved in the same direction, and no serious harms were recorded.

Against that, much of the evidence concerns bundled TCM regimens. Where Tuina and acupuncture were given together with herbs, traction or exercise, no pooled analysis can say which element did the work. A factorial design that separates Tuina, acupuncture and their combination would answer whether the pairing adds anything over either alone, and we know of no trial that has done so.

7.2. Practical implications

For mild to moderate LDH, Tuina with acupuncture is a reasonable first-line option, especially where NSAIDs are contraindicated or poorly tolerated. During the acute phase (days 1 to 14), gentle soft-tissue work can be combined with segmental acupuncture at BL23, GV3 and Huatuo Jiaji. That allows pain control without high-dose anti-inflammatory drugs, in line with the preservation strategy, although we stress that the strategy is a hypothesis. As radicular irritation settles, treatment can shift to dynamic spinal fine-tuning, core stabilization exercises and traditional Gongfu regimens to limit recurrence. Progressive neurological deficit or suspected cauda equina syndrome calls for urgent surgical assessment instead.

7.3. Priorities for future trials

Future trials should register their protocols in advance on ClinicalTrials.gov or ChiCTR and report all seven Core Outcome Set domains (Qin et al., 2026), which would make later pooling much easier. They need central web-based randomization with concealed allocation, and independent assessors, including orthopaedic surgeons, radiologists and statisticians, who are masked to group. Follow-up should last 12 to 24 months to capture true re-herniation, volumetric 3D MRI resorption and lasting function.

7.4. Limitations of this synthesis

Our figures are second-hand, since we relied on published meta-analyses and did not re-extract trial data. Overlap between trials included in different reviews is likely and may exaggerate apparent consistency. The certainty ratings are our own judgement. Finally, several outcome domains of the Core Outcome Set, especially recurrence, SLR angle, TCM syndrome pattern and sciatica frequency, were too sparsely reported to pool.

8. Conclusion

Published meta-analyses link Tuina combined with acupuncture to meaningful reductions in pain (MD = −1.61 to −1.44 on the VAS), lower disability (ODI, MD = −8.52) and higher JOA scores (MD = 4.83) in patients with LDH. In patients with pain after LDH surgery, acupuncture was safer than oral drugs (OR = 0.27), and the manual therapy trials reported no serious harm.

These conclusions carry real limits. Certainty is low, blinding is largely impossible, heterogeneity is severe, and much of the data come from multi-modal packages instead of the Tuina–acupuncture pairing itself. The suggested compatibility with natural disc resorption is a hypothesis for testing, not a finding. Still, the combination looks like a plausible and low-risk element of conservative spine care, and adequately powered, assessor-blinded trials built on the Core Outcome Set would show how far that view holds.

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